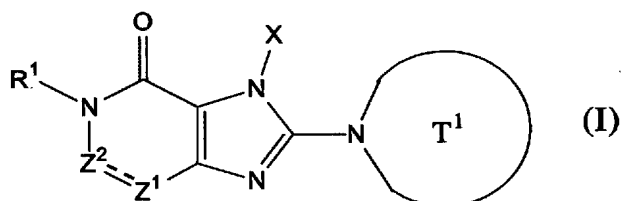


## CLAIMS

1. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound represented by formula (I), or a salt or hydrate thereof,

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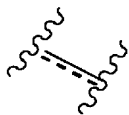
[wherein,

10  $T^1$  represents a mono- or bicyclic 4- to 12-membered heterocyclic group comprising one or two nitrogen atoms in a ring, which may have substituents;

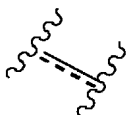
$X$  represents a  $C_{1-6}$  alkyl group that may have a substituent, a  $C_{2-6}$  alkenyl group that may have a substituent, a  $C_{2-6}$  alkynyl group that may have a substituent, a  $C_{6-10}$  aryl group that may have a substituent, a 5- to 10-membered heteroaryl group that may have a substituent, a  $C_{6-10}$  aryl  $C_{1-6}$  alkyl group that may have a substituent, or a 5- to 10-membered heteroaryl  $C_{1-6}$  alkyl group that

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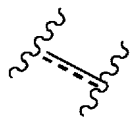
may have a substituent;  
in formula (I), the following formula



20 represents a single or double bond;  
and when the formula



25 represents a single bond,  $Z^1$  represents a group represented by the formula  $-NR^2-$ , and  $Z^2$  represents a carbonyl group;  
when the formula



represents a double bond,  $Z^1$  and  $Z^2$  each independently represent a nitrogen atom or a group represented by the formula  $-CR^2=$ ;

5  $R^1$  and  $R^2$  each independently represent a group represented by the formula  $-A^0-A^1-A^2$

(wherein,  $A^0$  represents a single bond or a  $C_{1-6}$  alkylene group that may have one to three groups selected from a substituent group B described below;

$A^1$  represents a single bond, an oxygen atom, a sulfur atom, a sulfinyl group, a sulfonyl group, a carbonyl group, a formula  $-O-CO-$ , a formula  $-CO-O-$ , a formula  $-NR^A-$ , a  
10 formula  $-CO-NR^A-$ , a formula  $-NR^A-CO-$ , a formula  $-SO_2-NR^A-$ , or a formula  $-NR^A-SO_2-$ ;

$A^2$  and  $R^A$  each independently represent a hydrogen atom, a halogen atom, a cyano group, a guanidino group, a  $C_{1-6}$  alkyl group, a  $C_{3-8}$  cycloalkyl group, a  $C_{3-8}$  cycloalkenyl group, a  $C_{2-6}$  alkenyl group, a  $C_{2-6}$  alkynyl group, a  $C_{6-10}$  aryl group, a 5- to  
15 10-membered heteroaryl group, a 4- to 8-membered heterocyclic group, a 5- to 10-membered heteroaryl  $C_{1-6}$  alkyl group, a  $C_{6-10}$  aryl  $C_{1-6}$  alkyl group, or a  $C_{2-7}$  alkyl carbonyl group;

with the proviso that  $A^2$  and  $R^A$  may each independently have one to three groups selected from substituent group B described below);

20 when  $Z^2$  represents the formula  $-CR^2=$ ,  $R^1$  and  $R^2$  may together form a 5- to 7-membered ring; <Substituent group B>

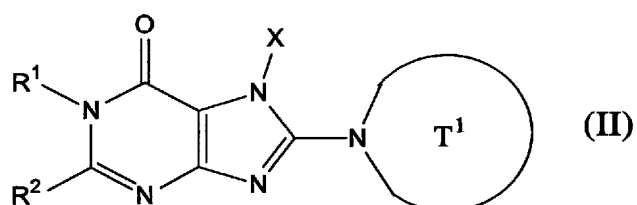
substituent group B refers to a group consisting of:

a hydroxyl group, a mercapto group, a cyano group, a nitro group, a halogen atom, a trifluoromethyl group, a trifluoromethoxy group, an alkylenedioxy group, a  $C_{1-6}$  alkyl group that  
25 may have a substituent, a  $C_{3-8}$  cycloalkyl group, a  $C_{2-6}$  alkenyl group, a  $C_{2-6}$  alkynyl group, a  $C_{6-10}$  aryl group, a 5- to 10-membered heteroaryl group, a 4- to 8-membered heterocyclic group, a  $C_{1-6}$  alkoxy group, a  $C_{1-6}$  alkylthio group, groups represented by the formulae  $-SO_2-NR^{B1}-R^{B2}$ ,  $-NR^{B1}-CO-R^{B2}$ , and  $-NR^{B1}-R^{B2}$  (where  $R^{B1}$  and  $R^{B2}$  each independently represent a hydrogen atom or a  $C_{1-6}$  alkyl group), a group represented by the formula  $-CO-R^{B3}$  (where  $R^{B3}$  represents a  
30 4- to 8-membered heterocyclic group), and groups represented by the formulae  $-CO-R^{B4}-R^{B5}$  and  $-CH_2-CO-R^{B4}-R^{B5}$  (where  $R^{B4}$  represents a single bond, an oxygen atom, or a formula  $-NR^{B6}-$ ;  $R^{B5}$  and  $R^{B6}$  each independently represent a hydrogen atom, a  $C_{1-6}$  alkyl group, a  $C_{3-8}$  cycloalkyl group, a  $C_{2-6}$  alkenyl group, a  $C_{2-6}$  alkynyl group, a  $C_{6-10}$  aryl group, a 5- to 10-membered heteroaryl group, a 4- to 8-membered heterocyclic  $C_{1-6}$  alkyl group, a  $C_{6-10}$  aryl  $C_{1-6}$  alkyl group,

or a 5-10-membered heteroaryl C<sub>1-6</sub> alkyl group)].

2. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound represented by formula (II), or a salt or hydrate thereof,

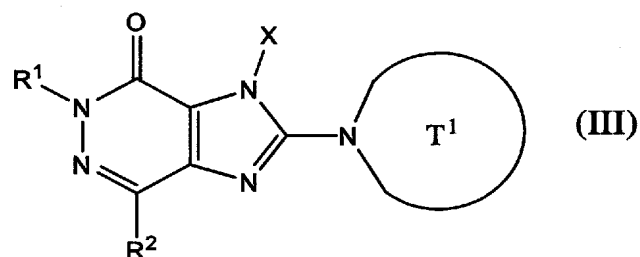
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[wherein, X, R<sup>1</sup>, R<sup>2</sup> and T<sup>1</sup> have the same meaning as X, R<sup>1</sup>, R<sup>2</sup> and T<sup>1</sup> of claim 1].

10

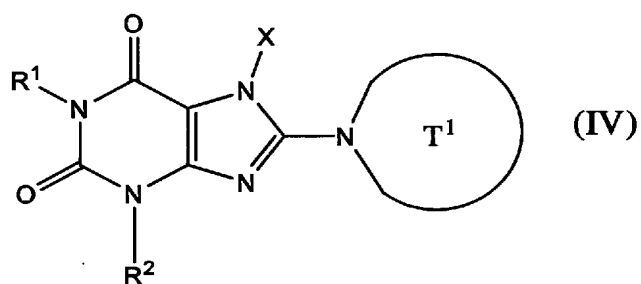
3. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound represented by formula (III), or a salt or hydrate thereof,



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[wherein, X, R<sup>1</sup>, R<sup>2</sup> and T<sup>1</sup> have the same meaning as X, R<sup>1</sup>, R<sup>2</sup> and T<sup>1</sup> of claim 1].

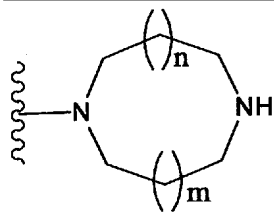
4. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound represented by formula (IV), or a salt or hydrate thereof,



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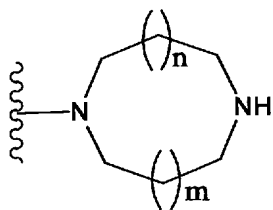
[wherein, X, R<sup>1</sup>, R<sup>2</sup> and T<sup>1</sup> have the same meaning as X, R<sup>1</sup>, R<sup>2</sup> and T<sup>1</sup> of claim 1].

5. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 4, or a salt or hydrate thereof, wherein T<sup>1</sup> described above is a group represented by the following formula:



10 (where n and m each independently represent zero or one), an azetidin-1-yl group that may have a substituent, a pyrrolidine-1-yl group that may have a substituent, a piperidine-1-yl group that may have a substituent, or an azepan-1-yl group that may have a substituent.

15 6. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 4, or a salt or hydrate thereof, wherein T<sup>1</sup> described above is a group represented by the following formula:



20 (where n and m each independently represent zero or one), an azetidin-1-yl group that may have an amino group, a pyrrolidin-1-yl group that may have an amino group, a piperidin-1-yl group that may have an amino group, or an azepan-1-yl group that may have an amino group.

25 7. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 4, or a salt or hydrate thereof, wherein T<sup>1</sup> described above is a piperazine-1-yl group or a 3-aminopiperidine-1-yl group.

8. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 4, or a salt or hydrate thereof, wherein T<sup>1</sup> described above is

a piperazine-1-yl group.

9. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound according to any one of claims 1 to 8, or a salt or hydrate thereof, wherein X described above is a group represented by the formula  $-X^1-X^2$  (where  $X^1$  represents a single bond or a methylene group that may have a substituent;  $X^2$  represents a  $C_{2-6}$  alkenyl group that may have a substituent, a  $C_{2-6}$  alkynyl group that may have a substituent, or a phenyl group that may have a substituent).

10. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 8, or a salt or hydrate thereof, wherein X described above is a group represented by the formula  $-X^{11}-X^{12}$  (where  $X^{11}$  represents a single bond or a methylene group;  $X^{12}$  represents a  $C_{2-6}$  alkenyl group, a  $C_{2-6}$  alkynyl group, or a phenyl group that may have a substituent).

11. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of claim 9 or 10, or a salt or hydrate thereof, wherein the phenyl group that may have at position 2 a substituent selected from the group consisting of:  
a hydroxyl group, a fluorine atom, a chlorine atom, a methyl group, an ethyl group, a fluoromethyl group, a vinyl group, a methoxy group, an ethoxy group, an acetyl group, a cyano group, a formyl group, and a  $C_{2-7}$  alkoxycarbonyl group.

12. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 8, or a salt or hydrate thereof, wherein X is a 3-methyl-2-buten-1-yl group, a 2-butyne-1-yl group, a benzyl group, or a 2-chlorophenyl group.

13. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 8, or a salt or hydrate thereof, wherein X is a 2-butyne-1-yl group.

14. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 13, or a salt or hydrate thereof, wherein  $R^1$  is a hydrogen atom or a group represented by the formula  $-A^{10}-A^{11}-A^{12}$  (wherein,  $A^{10}$  represents a  $C_{1-6}$  alkylene group that may have one to three groups selected from substituent group C described below;  $A^{11}$  represents a single bond, an oxygen atom, a sulfur atom, or a carbonyl group;

A<sup>12</sup> represents a hydrogen atom, a C<sub>6-10</sub> aryl group that may have one to three groups selected from substituent group C described below, a 5- to 10-membered heteroaryl group that may have one to three groups selected from substituent group C described below, a 5- to 10-membered heteroaryl C<sub>1-6</sub> alkyl group that may have one to three groups selected from substituent group C described below, or a C<sub>6-10</sub> aryl C<sub>1-6</sub> alkyl group that may have one to three groups selected from substituent group C described below);

<Substituent group C>

substituent group C refers to a group consisting of:

a hydroxyl group, a nitro group, a cyano group, a halogen atom, a C<sub>1-6</sub> alkyl group, a C<sub>1-6</sub> alkoxy group, a C<sub>1-6</sub> alkylthio group, a trifluoromethyl group, a group represented by the formula -NR<sup>C1</sup>-R<sup>C2</sup> (where R<sup>C1</sup> and R<sup>C2</sup> each independently represent a hydrogen atom or a C<sub>1-6</sub> alkyl group), and groups represented by the formulae -CO-R<sup>C3</sup>-R<sup>C4</sup> and -CH<sub>2</sub>-CO-R<sup>C3</sup>-R<sup>C4</sup> (where R<sup>C3</sup> represents a single bond, an oxygen atom, or a formula -NR<sup>C5</sup>-; and R<sup>C4</sup> and R<sup>C5</sup> each independently represent a hydrogen atom or a C<sub>1-6</sub> alkyl group).

15. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 13, or a salt or hydrate thereof, wherein R<sup>1</sup> described above is a hydrogen atom, a C<sub>1-6</sub> alkyl group that may have one to three groups selected from substituent group C described below, a 5- to 10-membered heteroaryl C<sub>1-6</sub> alkyl group that may have one to three groups selected from substituent group C described below, or a C<sub>6-10</sub> aryl C<sub>1-6</sub> alkyl group that may have one to three groups selected from substituent group C described below;

<Substituent group C>

substituent group C refers to a group consisting of:

a hydroxyl group, a nitro group, a cyano group, a halogen atom, a C<sub>1-6</sub> alkyl group, a C<sub>1-6</sub> alkoxy group, a C<sub>1-6</sub> alkylthio group, a trifluoromethyl group, a group represented by the formula -NR<sup>C1</sup>-R<sup>C2</sup> (where R<sup>C1</sup> and R<sup>C2</sup> each independently represent a hydrogen atom or a C<sub>1-6</sub> alkyl group), and groups represented by the formulae -CO-R<sup>C3</sup>-R<sup>C4</sup> and -CH<sub>2</sub>-CO-R<sup>C3</sup>-R<sup>C4</sup> (where R<sup>C3</sup> represents a single bond, an oxygen atom, or a formula -NR<sup>C5</sup>-; and R<sup>C4</sup> and R<sup>C5</sup> each independently represent a hydrogen atom or a C<sub>1-6</sub> alkyl group).

16. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of claim 14 or 15, or a salt or hydrate thereof, wherein substituent group C consists of a cyano group, a C<sub>1-6</sub> alkoxy group, a C<sub>2-7</sub> alkoxycarbonyl group, and halogen atom.

17. A preventive or therapeutic agent for multiple sclerosis, which comprises the

compound of any one of claims 1 to 13, or a salt or hydrate thereof, wherein  $R^1$  described above is a methyl group, a cyanobenzyl group, fluorocyanobenzyl group, a phenethyl group, a 2-methoxyethyl group, or a 4-methoxycarbonylpyridin-2-yl group.

5           18. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 13, or a salt or hydrate thereof, wherein  $R^1$  is a methyl group or a 2-cyanobenzyl group.

10           19. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein  $R^2$  is a hydrogen atom, a cyano group, or a group represented by the formula  $-A^{21}-A^{22}$  (where  $A^{21}$  represents a single bond, an oxygen atom, a sulfur atom, a sulfinyl group, a sulfonyl group, a carbonyl group, a formula  $-O-CO-$ , a formula  $-CO-O-$ , a formula  $-NR^{A2}-$ , a formula  $-CO-NR^{A2}-$ , or a formula  $-NR^{A2}-CO-$ ;  $A^{22}$  and  $R^{A2}$  each independently represent a hydrogen atom, a cyano group, a  $C_{1-6}$  alkyl group, a  $C_{3-8}$  cycloalkyl group, a  $C_{2-6}$  alkenyl group, a  $C_{2-6}$  alkynyl group, a  $C_{6-10}$  aryl group, a 5- to 10-membered heteroaryl group, a 4- to 8-membered heterocyclic group, a 5- to 10-membered heteroaryl  $C_{1-6}$  alkyl group, or a  $C_{6-10}$  aryl  $C_{1-6}$  alkyl group; with the proviso that  $A^{22}$  and  $R^{A2}$  each independently may have one to three groups selected from substituent group D described below);

20           <Substituent group D>

substituent group D refers to a group consisting of:

a hydroxyl group, a cyano group, a nitro group, a halogen atom, a  $C_{1-6}$  alkyl group, a  $C_{1-6}$  alkoxy group, a  $C_{1-6}$  alkylthio group, a trifluoromethyl group, a group represented by the formula  $-NR^{D1}-R^{D2}$  (where  $R^{D1}$  and  $R^{D2}$  each independently represent a hydrogen atom or a  $C_{1-6}$  alkyl group), a group represented by the formula  $-CO-R^{D3}$  (where  $R^{D3}$  represents a 4- to 8-membered heterocyclic group), and a group represented by the formula  $-CO-R^{D4}-R^{D5}$  (where  $R^{D4}$  represents a single bond, an oxygen atom, or a formula  $-NR^{D6}-$ ;  $R^{D5}$  and  $R^{D6}$  each independently represent a hydrogen atom, a  $C_{3-8}$  cycloalkyl group, or a  $C_{1-6}$  alkyl group).

30           20. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein  $R^2$  described above is a hydrogen atom, a cyano group, a carboxy group, a  $C_{2-7}$  alkoxy carbonyl group, a  $C_{1-6}$  alkyl group, a group represented by the formula  $-CONR^{D7}R^{D8}$  (wherein  $R^{D7}$  and  $R^{D8}$  each independently represent a hydrogen atom or a  $C_{1-6}$  alkyl group), or a group represented by the formula  $-A^{23}-A^{24}$  (where  $A^{23}$  represents an oxygen atom, a sulfur atom, or a formula  $-NR^{A3}-$ ;  $A^{24}$  and  $R^{A3}$  each independently represent a hydrogen atom, a  $C_{1-6}$  alkyl group that may have a group

selected from substituent group D1 described below, a C<sub>3-8</sub> cycloalkyl group that may have a group selected from substituent group D1 described below, a C<sub>2-6</sub> alkenyl group that may have a group selected from substituent group D1 described below, a C<sub>2-6</sub> alkynyl group that may have a group selected from substituent group D1 described below, a phenyl group that may have a group selected from substituent group D1 described below, or a 5- to 10-membered heteroaryl group that may have a group selected from substituent group D1 described below);

<Substituent group D1>

substituent group D1 refers to a group consisting of:

a carboxy group, a C<sub>2-7</sub> alkoxy carbonyl group, a C<sub>1-6</sub> alkyl group, a group represented by the formula -CONR<sup>D7</sup>R<sup>D8</sup> (wherein R<sup>D7</sup> and R<sup>D8</sup> each independently represent a hydrogen atom or a C<sub>1-6</sub> alkyl group), a pyrrolidin-1-yl carbonyl group, a C<sub>1-6</sub> alkyl group, and a C<sub>1-6</sub> alkoxy group.

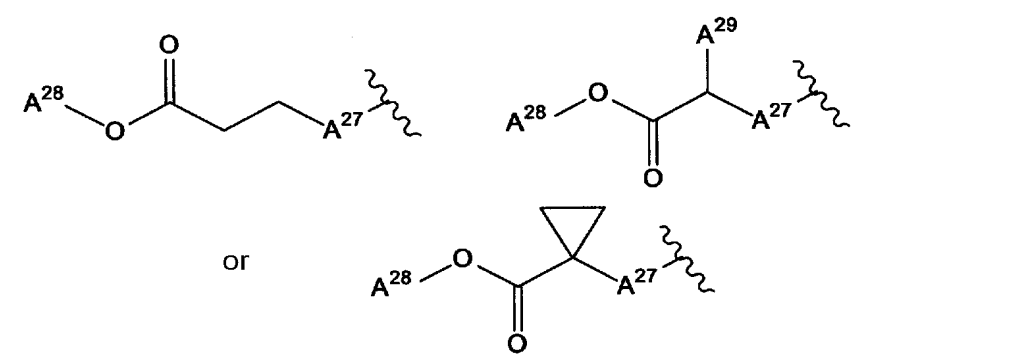
21. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein R<sup>2</sup> described above is a hydrogen atom, a methyl group, a cyano group, a C<sub>1-6</sub> alkoxy group, or a group represented by the formula -A<sup>25</sup>-A<sup>26</sup> (where A<sup>25</sup> represents an oxygen atom, a sulfur atom, or a formula -NR<sup>A4</sup>-; A<sup>26</sup> and R<sup>A4</sup> each independently represent a hydrogen atom, a C<sub>1-6</sub> alkyl group that may have a group selected from substituent group D1 described below, a C<sub>3-8</sub> cycloalkyl group that may have a group selected from substituent group D1 described below, or a phenyl group that may have a group selected from substituent group D1 described below);

<Substituent group D1>

substituent group D1 refers to a group consisting of:

a carboxy group, a C<sub>2-7</sub> alkoxy carbonyl group, a C<sub>1-6</sub> alkyl group, a group represented by the formula -CONR<sup>D7</sup>R<sup>D8</sup> (wherein R<sup>D7</sup> and R<sup>D8</sup> each independently represent a hydrogen atom or a C<sub>1-6</sub> alkyl group), a pyrrolidin-1-yl carbonyl group, a C<sub>1-6</sub> alkyl group, and a C<sub>1-6</sub> alkoxy group.

22. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein R<sup>2</sup> described above is a hydrogen atom, a cyano group, a methoxy group, a carbamoylphenyloxy group, or a group represented by the following formula:



(where  $A^{27}$  represents an oxygen atom, a sulfur atom, or -NH-;  
 $A^{28}$  and  $A^{29}$  each independently represent a hydrogen atom or a  $C_{1-6}$  alkyl group).

- 5
23. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of any one of claims 1 to 18, or a salt or hydrate thereof, wherein  $R^2$  described above is a hydrogen atom, a cyano group, or a 2-carbamoylphenyloxy group.
- 10
24. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of claim 1, or a salt or hydrate thereof, wherein the compound represented by formula (I) is any one of the compounds selected from the group consisting of:
- 7-(2-butynyl)-1,3-dimethyl-8-(piperazin-1-yl)-3,7-dihydropurine-2,6-dione,  
 7-(2-butynyl)-2-cyano-1-methyl-8-(piperazin-1-yl)-1,7-dihydropurin-6-one,  
 15 3-(2-butynyl)-5-methyl-2-(piperazin-1-yl)-3,5-dihydroimidazo[4,5-d]pyridazin-4-one,  
 2-(3-aminopiperidin-1-yl)-3-(2-butynyl)-5-methyl-3,5-dihydroimidazo[4,5-d]pyridazin-4-one,  
 2-[7-(2-butynyl)-1-methyl-6-oxo-8-(piperazin-1-yl)-6,7-dihydro-1H-purin-2-yloxy]benzamide,  
 7-(2-butynyl)-1-(2-cyanobenzyl)-6-oxo-8-(piperazin-1-yl)-6,7-dihydro-1H-purine-2-carbonitrile,  
 and  
 20 2-[3-(2-butynyl)-4-oxo-2-(piperazin-1-yl)-3,4-dihydroimidazo[4,5-d]pyridazin-5-ylmethyl]benzo nitrile.
25. A preventive or therapeutic agent for multiple sclerosis, which comprises the compound of claim 1, or a salt or hydrate thereof, wherein the compound represented by formula (I) is any one of the compounds selected from the group consisting of:
- 7-(2-butynyl)-2-cyano-1-methyl-8-(piperazin-1-yl)-1,7-dihydropurin-6-one,  
 3-(2-butynyl)-5-methyl-2-(piperazin-1-yl)-3,5-dihydroimidazo[4,5-d]pyridazin-4-one,  
 2-(3-aminopiperidin-1-yl)-3-(2-butynyl)-5-methyl-3,5-dihydroimidazo[4,5-d]pyridazin-4-one,  
 2-[7-(2-butynyl)-1-methyl-6-oxo-8-(piperazin-1-yl)-6,7-dihydro-1H-purin-2-yloxy]benzamide,

7-(2-butynyl)-1-(2-cyanobenzyl)-6-oxo-8-(piperazin-1-yl)-6,7-dihydro-1H-purine-2-carbonitrile,  
and  
2-[3-(2-butynyl)-4-oxo-2-(piperazin-1-yl)-3,4-dihydroimidazo[4,5-d]pyridazin-5-ylmethyl]benzo  
nitrile.